CONFIGURABLE DRIVESHAFT ASSEMBLY

BACKGROUND OF THE INVENTION

[1] The present invention relates generally to a vehicle drivetrain assembly and, more particularly, to a configurable driveshaft assembly.

[2] Generally, the driveshaft operates within the drivetrain system to transmit torque from the engine to the axles and wheels. Engine torque is transmitted through a transmission to a forward driveshaft. The forward driveshaft transmits the torque through a forward axle and to the forward vehicle wheels. An interaxle driveshaft connects from the forward axle to the rear axle and transmits torque to the rear axle and to the rear vehicle wheels.

[3] A driveshaft is typically assembled of two halves, a male half and a female half. When connected, the two halves form a driveshaft length for assembly into a particular vehicle configuration. Each vehicle typically requires a unique driveshaft assembly.

[4] Conventional driveshafts utilize a tube on the male half in order to lengthen the driveshaft assembly. In this configuration the male half consists of a number of attached segments, one of the segments being the tube. By using a longer or shorter tube, the length of the assembly is made longer or shorter, respectively. Still, this type of tube assembly configuration may not adequately address the multiplicity of driveshaft configurations, particularly shorter lengths, as a minimal length is limited by the length of the female half. Therefore, numerous unique components are often required for each vehicle configuration.

[5] Accordingly, it is desirable to provide for commonality of driveshaft components as well as improved capability in adapting a common driveshaft assembly to a particular vehicle driveshaft length.

SUMMARY OF THE INVENTION

[6] The driveshaft assembly of the present invention includes a common male component and a female component in engagement with the male component. The female component includes a yoke, a configurable segment, a positive stop member, a receptacle member, and a seal. There are plural, optional configurable segments each having a predetermined length

that corresponds to a particular total vehicle driveshaft length. The present invention therefore provides for common driveshaft components among vehicles having different driveshaft assembly lengths by utilizing a different length configurable segment in each assembly.

[7] The driveshaft assembly according to the present invention provides for commonality of driveshaft components as well as improved capability in adapting a common driveshaft assembly to a particular vehicle driveshaft length.

BRIEF DESCRIPTION OF THE DRAWINGS

[8] The various features and advantages of this invention will become apparent to those skilled in the art from the following detailed description of the currently preferred embodiment. The drawings that accompany the detailed description can be briefly described as follows:

[9] Figure 1 is a schematic view of a drivetrain system;

[10] Figure 2 is a cross-sectional view of a driveshaft assembly according to the present invention;

[11] Figure 3 is a detailed view of a male component as illustrated in Figure 2;

[12] Figure 4 is an exploded view of a female component as illustrated in Figure 2; and

[13] Figure 5 is a cross-sectional view of another driveshaft assembly according to the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[14] Figure 1 refers to a vehicle drivetrain system 10 of a tandem axle configuration. Within the drivetrain system 10 there is an engine 12 that transmits power through a transmission 14 to a forward driveshaft assembly 16. The forward driveshaft assembly 16 transmits the engine power to a forward drive axle 18 which in turn drives the front tires 20. An interaxle driveshaft assembly 24 is coupled to the forward drive axle 18 and transmits engine power to a rear axle 26. The rear axle 26 in turn drives the rear tires 28.

[15] Figure 2 illustrates a driveshaft assembly including a male component 32 and a female component 34. It should be understood that the term driveshaft as used herein includes the forward driveshaft, interaxle driveshaft, and other drivetrain components that likewise benefit from the invention. The female component 34 is in sliding engagement with the male component 32 along an axis A. A grease fitting 38 and welch plug 40 are disposed in the female component 34. A seal 42 between the male component 32 and female component 34 prevents intrusion of foreign particles into the driveshaft assembly 24 and maintains lubrication for the sliding engagement between the male component 32 and female component 34.

[16] Referring to Figure 3, the male component 32 includes a male yoke 50 which tapers into a stem portion 54. One segment of the stem portion 54 is a splined segment 56A which allows a sliding engagement with corresponding internal splines 56B (Figure 4) within the female component 34.

[17] Referring to Figure 4, the female component 34 includes a female yoke 60 and a configurable segment 36. The configurable segment 36 is preferably tubular, however, other configurations will likewise benefit from the present invention. The configurable segment 36 comprises a rolled tube. The surrounding female components are preferably machined components. Alternatively, the configurable segment 36 may also comprise a machined component.

[18] The configurable segment 36 has a beveled end portion 66 which engages female yoke beveled edge 68 and a second beveled edge 67 which engages a receptacle member 62 at stop 70.

[19] Receptacle member 62 includes the welch plug 40 and a cylindrical member 72 which contains the internal splines 56B extending from an inner peripheral bore 52. The internal splines 56B provide sliding engagement with splined segment 56A (Figure 3) of the male component 32. The female component 34 provides a grease aperture 138 to receive the grease fitting 38. A seal 42 (Figures 2 and 5) prevents debris and the like from entering into the female component 34 as the male component 32 slides relative thereto.

[20] The beveled edge 66 on the reconfigurable portion 36 abuts a corresponding outer surface 68 on the yoke 60. Similarly, the beveled edge 67 abuts a stop 70 on the receptacle

portion 62. Further, as can be appreciated from Figures 2 and 5, the seal 42 seals against an outer peripheral surface of the stem portion 54 of the male component 32. As can be appreciated from Figures 2 and 5, the seal also abuts the yoke 50 at the end of the male component 32.

[21] Referring to Figure 5, the driveshaft assembly 80 has a length L_4 that is longer than the driveshaft assembly 24 length L_1 (Figure 2). Driveshaft assembly 80 includes a configurable segment 78 having a length L_3. Driveshaft assembly 24 has a configurable segment 36 having a shorter length L_2. Except for the configurable segment, the driveshaft assembly 80 utilizes the same components as the driveshaft assembly 24. The overall desired driveshaft length is therefore readily configurable with a minimum number of components. One thus selects any one of several optional length configurable segments to result in a total driveshaft length as desired.

[22] The foregoing description is exemplary rather than definitive in nature. Many modifications and variations of the present invention are possible in light of the above teachings. The preferred embodiments of this invention have been disclosed, however, one of ordinary skill in the art would recognize that certain modifications would come within the scope of this invention. It is, therefore, to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described. For that reason the following claims should be studied to determine the true scope and content of this invention.